CLAIMS

We claim:

1. A method of fabricating a heat exchanger comprising:

a) providing a plurality of generally parallel tube runs of a flattened heat exchange tube having a major dimension and a minor dimension;

b) providing a plurality of plate fins, each having a plurality of tube slots approximately equal to the number of tube runs, each slot opening to an edge of the associated fin and having

i) a shape corresponding to the cross-sectioned shape a tube run to be received in the slot,

ii) a depth less than the major dimension of the tube run to be received in the slot, and

iii) a width approximately equal to or slightly less than the minor dimension of the tube run to be received in the slot;

c) fitting the tube runs snugly into corresponding slots in each of the fins such that an edge of each tube run extends a distance out of the slots in which it is received;

d) locating the assembly resulting from step c) on a supporting surface with said tube run edges in contact with said supporting surface and with said plate fins extending above said tube runs; and

e) subjecting said assembly to an elevated temperature sufficient to braze said fin to said tube runs while said assembly is on said supporting surface and in the absence of brazing fixtures holding said fins and said tube runs in assembled relation.

2. The method of claim 1 wherein said tube runs are defined by straight sections of a serpentine tube.

3. The method of claim 1 wherein said tube runs are each defined by a straight piece of tubing.

4. The method of claim 1 wherein the cross-section of said tube runs is tear-drop shaped.

5. The method of claim 1 wherein the cross-section of said tube runs is oval-shaped.

6. The method of claim 1 wherein said fins are curved at locations between said slots.

7. The method of claim 1 wherein said fins and said tube runs are formed of aluminum and/or alloys thereof.

8. A method of fabricating an aluminum and/or aluminum alloy heat exchanger comprising the steps of:

a) assembling a plurality of plate fins having open ended slots to a plurality of tube runs having the same cross-section shape as the slots such that an edge of each tube run extends a short distance out of the slots in which it is received;

b) locating the assemblage resulting from step a) on a supporting surface with said tube run edges contacting said supporting surface and said fins above and out of contact with said supporting surface;

c) locating an aluminum braze alloy at the interfaces of said tube runs and said fins; and

d) subjecting the assembly resulting from the preceding steps to aluminum brazing temperatures in the absence of brazing fixtures holding said tube runs and said fins in assembled relation for a time sufficient to allow said fins to settle under gravitational forces onto said tube runs.

9. The method of claim 8 wherein step c) is performed by cladding one or both of said fins and said tube runs with said aluminum braze alloy prior to the performance of step a).

10. The method of claim 8 wherein said tube runs are of flattened tubing having a major dimension and a minor dimension and said slots have a depth somewhat less than said major dimension.

11. The method of claim 8 including the step of providing the fins with curved sections between said slots.

12. A method of fabrication of a heat exchanger comprising the steps of:

a) assembling a plurality of plate fins having open ended slots to a plurality of tube runs having the same cross-section shape as the slots such that an edge of each tube run extends a short distance out of the slots in which it is received;

b) locating the assemblage resulting from step a) on a supporting surface with said tube run edges contacting said supporting surface and said fins above and out of contact with said supporting surface; and

c) subjecting the assembly resulting from the preceding steps to brazing temperature in the absence of brazing fixtures holding said tube runs and said fins in assembled relation for a time sufficient to allow said fins to settle under gravitational forces onto said tube runs.

Sub B1

13. An aluminum heat exchanger, comprising:

first and second headers;

at least one flattened tube extending between and in fluid communication with said headers and defining a plurality of generally parallel tube runs in spaced relation to one another;

cont'd B3

each said tube runs having opposite edges defining a tube major dimension and interconnecting side walls defining a tube minor dimension and a plurality of interior ports;

a plurality of plate fins arranged in a stack and each having a plurality of open ended tube run receiving slots, one for each tube run, each slot having a shape generally that of the cross-section of the tube run to be received therein, a width equal to or just less than the minor dimension of the corresponding tube run and a depth somewhat less than the major dimension of the corresponding tube run;

each said tube run being nested within corresponding slots in said fins with one of said edges of each tube run located outwardly of the corresponding fin; and

said headers, said tube runs and said fins comprising a brazed assembly.

Sub B7

14. The heat exchanger of claim 13 wherein said tube runs are defined by individual tubes.

15. The heat exchanger of claim 13 wherein said tube runs are defined by at least one serpentine tube.

16. The heat exchanger of claim 13 wherein said slots are at least partially bounded by flanges brazed to said tube runs.

17. The heat exchanger of claim 13 wherein said slots have flange free edges brazed to said tube runs.

18. The heat exchanger of claim 13 wherein said fins are curved at locations between said slots.

19. The heat exchanger of claim 13 wherein said plate fins are elongated and said slots open to one elongated edge thereof, the other elongated edge being uninterrupted by said slots.

20. The heat exchanger of claim 19 including a stiffening bead between said other elongated edge and said slots.

21. The heat exchanger of claim 18 wherein said plate fins are elongated and said slots open to both elongated edges thereof.

Sub B1 22. The heat exchanger of claim 21 wherein the slots opening to one of said elongated edges are aligned with the slots opening to the other of said elongated edges.

23. The heat exchanger of claim 21 including an elongated uninterrupted band extending in the direction of elongation of said plate fins located between the slots opening to said one elongated edge and the slots opening to said other elongated edge.

24. The heat exchanger of claim 21 wherein said tube runs are defined by the legs of U-shaped tubes, one of said legs of each U-shaped tube being disposed in a slot opening to one elongated edge of said plate fin and the other leg being disposed in a slot opening to the other elongated edge.

25. The heat exchanger of claim 24 wherein the slots opening to opposite ones of said elongated edges are aligned and the legs of each said U-shaped tube are located in aligned ones of said slots.

Sub D1>

26. The heat exchanger of claim 25 wherein each of said legs of each of said U-shaped tubes includes an angled twist of an angle up to and including 90° immediately adjacent the bight of the corresponding U-shaped tube.

27. The heat exchanger of claim 13 wherein said parallel tube runs are defined by a plurality of U-shaped tubes, each having two parallel legs connected by a bight and there are two sets of said plate fins, one set disposed on corresponding first ones of the legs and the other set disposed on corresponding others of the legs.

Sub B2

28. The heat exchanger of claim 27 wherein each of said legs of each of said U-shaped tubes includes a 90° twist immediately adjacent the bight of the corresponding U-shaped tube.

Sub D1>

29. A heat exchanger core comprising:

a plurality of generally parallel tube runs formed of flattened, multi-port tubing; and

a plurality of plate fins in a stacked relation and having spaced openings sufficient to receive said tube runs;

said tube runs being disposed in said openings and having a major dimension brazed to the plate fins about said openings;

the parts of said plate fins between the openings being arcuate in a direction generally transverse to said major dimension to thereby increase the surface area of the fins between the openings without the need to increase the spacing between adjacent openings.

30. The heat exchanger of claim 29 wherein said openings are slots extending into the fins from one edge thereof.

add B3

add A1